



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): S. WU

Attorney Docket No: 20002.0249

Application No.: 10/194,057

Group Art Unit: 1712

Filed: July 15, 2002

Examiner: D. Buttner

For: GOLF BALL COMPRISING SATURATED
POLYURETHANES AND METHODS OF
MAKING SAME

DECLARATION OF SHENSHEN WU UNDER 37 CFR § 1.131

Commissioner for Patents
Washington, D.C. 20231

Sir:

I, Shenshen WU, hereby declare that:

1. I am a citizen of the United States, and reside at 334 Old Westport Road, North Dartmouth, MA 02747.
2. That I am the inventor of the invention disclosed and claimed in the above-identified patent application.
3. That over the past 20 years I have been employed by ACUSHNET COMPANY (formerly doing business as Titleist and Foot-joy Worldwide), 333 Bridge Street, Fairhaven, MA 02719, the Assignee of record of the entire, right, title and interest in the invention claimed in the present application, as well as U.S. Patent No. 6,610,812.
4. I presently hold the position of Project Manager, Research & Development.
5. That this declaration is filed to show that prior to April 26, 2002, I conceived and reduced to practice the subject matter of the claimed invention.

6. That attached hereto are Exhibits A, B, C, and D. Exhibit A includes a copy of a vendor letter forwarding samples of aliphatic polyurethane prepolymers to the inventor; Exhibit B includes a copy of a lab notebook page demonstrating that the prepolymers are the reaction product of an aliphatic isocyanate and a dimerate polyester polyol and that the samples were intended to be used in golf ball covers; Exhibit C includes detailed product specification regarding the PRO V1 ball; and Exhibit E includes lab notebook pages outlining the process for forming golf ball compositions and golf balls using the samples of Exhibit A and performance data from golf balls made according to the compositions of the invention. The dates of Exhibits A-B and D have been deleted in accordance with standard practice, but the documentation included therein is prior to April 26, 2002.
7. Exhibit A includes a letter from PSC indicating three variations of aliphatic prepolymers including dimerate polyester polyols sent to the inventor for evaluation prior to the April 26, 2002 filing date of the Rosenberg reference.
8. Exhibit B includes a lab notebook page detailing that the prepolymer samples received from PSC were prepared from 4,4'-dicyclohexylmethane diisocyanate (H₁₂MDI) and a copolymer of polybutylene adipate and dimerate polyol. In addition, Exhibit B states that the objective of the evaluation of the samples is to evaluate the properties of the dimerate polyol as a golf ball cover.
9. That all of the research I have conducted regarding light stable urethane covers and improvements thereon, which includes the polyurea cover of the present invention, was intended for use on a golf ball with a PRO V1 type of construction, *i.e.*, a core, an inner casing of ionomeric material, and a light stable cover.
10. Exhibit C includes documentation gathered by way of the internet search engine "Wayback Machine" (<http://web.archive.org>), which allows searching of a particular internet page as it appeared at a previous date in time. As such, the archived information provided in Exhibit C demonstrates the construction of Titleist's PRO V1 golf ball prior to April 26, 2002.

11. Exhibit D provides the results of experiments performed prior to the April 26, 2002 filing date of Rosenberg using aliphatic polyurethane compositions for golf balls, where the prepolymers were formed from aliphatic diisocyanates and dimerate polyester polyols. Of the eight examples appearing in the table, three are directed to the prepolymers originally sent to me for evaluation and discussed above with respect to Exhibits A and B. In particular, prepolymers PMS 1297P, PMS 1298P, and PMS 1299P are the reaction product of an aliphatic diisocyanate (4,4'-dicyclohexylmethane diisocyanate (H_{12} MDI)) and a copolymer of polybutylene adipate and dimerate polyol. The table indicates that the prepolymer was cured using an aliphatic curing agent, *i.e.*, 1,4 BDO (1,4-butanediol). The material and cover hardness, compression and other physical properties of the golf ball, and performance data (including light stability and performance data) are also provided in the results. For example, the change in yellowness index (ΔYI) after 8 days for the compositions including PMS 1297P, PMS 1298P, and PMS 1299P is 10.6, 7.3, and 5.5, respectively.

12. That I have reviewed the documents of Exhibits A - D. Although the dates of Exhibits A-B and D have been blanked out, the dates are all prior to April 26, 2002. I hereby confirm that the work evidenced by the documents of Exhibit A-B and D and all the acts relied upon in this Declaration were carried out by me or by someone acting at my direction in the United States prior to April 26, 2002.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectfully Submitted,

Date: 9/23/2004

Shenshen WU
Shenshen WU

EXHIBIT A

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Shenshen Wu
Project Manager
Titleist and Foot-Joy Worldwide
333 Bridge St.
Fairhaven, MA 02719

Dear Ms. Wu:

Per your request, the following samples are being sent to your attention for evaluation.

A brief description of sample(s) follows:

- (1) Gallon of PMS 1297 P (Polyester/Aliphatic Elastomer), Lot# KA 415-1 *Softer than 1233 P*
Prepared to 9.11% NCO Visc.@100°C=480 cps
- (1) Gallon of PMS 1298 P (Polyester/Aliphatic Elastomer), Lot# KA 415-2 *harder than 1233 P*
Prepared to 9.15%NCO Visc.@100°C=540 cps
- (1) Gallon of PMS 1299 P (Polyester/Aliphatic Elastomer), Lot# KA 415-7 *Softer than 1233 P*
Prepared to 9.1% NCO Visc.@100°C=560 cps

Also included with the samples are MSDS information. Should you have any questions regarding these samples please do not hesitate to call Jack Carter or myself for clarification.

Sincerely,

A handwritten signature in black ink, appearing to read 'Ken Adkins', is written over the word 'Sincerely,'.

Ken Adkins

cc:DP,RM,JC,File

Polyurethane Specialties Company, Inc.
624 Schuyler Avenue • Lyndhurst, NJ 07071
Telephone: (201) 438-2325 • Fax: (201) 507-1367

EXHIBIT B

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PMS 1298P and PMS 1299P
Prepolymers

Evaluation of Dimerate Polyols from Uniquema.

PMS 1298P and PMS 1299P are prepolymers prepared from H₁₂ MDI and co-polymers of polybutylene adipate and dimerate polyols.

Purpose: To evaluate the properties of the dimerate polyol as golf ball covers.

PMS 1299P : 100% Dimerate Polyol

PMS 1298P : 9.15% NCO

PMS 1299P : 9.10% NCO

Shenchen Wu

EXHIBIT C

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124 Results

Search Results for Jan 01, 1996 - Sep 23, 2004

1996	1997	1998	1999	2000	2001	2002	2003	2004
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1 2 3 4



TITLEIST PRO V1

The new Titleist Pro V1 utilizing large core, multi-component urethane elastomer technology, became the #1 non-wound golf ball in just its first week on the PGA Tour.

The Pro V1's higher ball speed and lower spin combine to produce very long driver and iron distance. Higher launching with a flatter, less arcing ascent, the Pro V1 has a ball flight which holds its line even in very windy conditions. With short irons, its higher launch and steeper angle of descent provide Drop and Stop™ performance into the green. The very thin urethane elastomer cover provides soft, solid feel and offers shear and abrasion



specs

> | [Pro V1 Ball Specs](#)



tour winners

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PRODUCT FEATURES

- ☐ Large (1.550") diameter, soft and resilient rubber core
- ☐ Speed enhancing and spin controlling ionomer casing
- ☐ High performance, soft and thin Urethane Elastomer cover
- ☐ Tour-proven, 392 icosahedron dual dimple design

PLAYER BENEFITS

- ☐ Long, distance with driver and iron
- ☐ Straight, tight ball flight
- ☐ Drop-and-Stop™ performance into the green
- ☐ Soft, high performance feel
- ☐ Shear and abrasion-resistant durability

SRP: \$54/dozen

EXHIBIT D

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(A) RMS 1298P 9-15/ NCO

Hand/copolymer of Polybutylene Adipate + Dimeric Polyol

(B) SUBSISTE, 1.4 BDO, T-12

(A)

46.01

DIATR

Dgn 1/2 hour 65°C

(B)

PAGE

3-13

1.4 BDO

2-60

Dgn 1/2 hour

Rt

T-12 4 drops

MIXED AT 30/2000

Gel Time 50-60 sec

Mold 787 at 155° with 50 min 185° polymer

Molded Ball / Not Blended for

Process still not perfect

Material has Brown tint

WITNESSED AND UNDERSTOOD

SIGNED

DATE

SIGNED

DATE

SIGNED

DATE

Shaw Rice

DATE

SUBJECT

PMS 1299P 9-1% NCO

PROJECT NO.

65

(A) PMS 1299P 9-1% NCO

H₂ADT / copolymer of styrene adipate + diethyl phthalate

(B) SUBSTRATE / 1.4 BDO T-12

(A)

46-26

+ D AIR

DESAT 1/2 hour 65°C

4 drops T-12

MIXED 30/2000

Gel 40 Sec

MOM 125°F / 155 35 min post cure "787"

MATERIAL has BROWN tint

Molded 3 dozen / yield 2 dozen acceptable for physicals

Not enough for 95% there

* PRODUCE STILL NEED WORK *

(B)

PMS 3-13

1.4 BDO 2.60

① gas 1/2 hour RT

WITNESSED AND UNDERSTOOD

SIGNED

DATE

SIGNED

Shawn Rice

URETHANE RESEARCH DATA SHEET

Molding Method	PROV1	450LSU	PMS 1233P	PMS 1294P	PMS 1295P
Isocyanate	PMS 1088 6.0% NCO	QC4934A 9.1% NCO	PMS 1233P 10.51%	PMS 1294P 10.75%	PMS 1295P 11.3%
Curing	E-300	1,4 BDO	1,4 BDO	1,4 BDO	1,4 BDO
Catalyst		S28755PST3	S28755PST3	S28755PST3	S28755PST3
Hardness		.125% T-12	.125% T-12	.125% T-12	.125% T-12
Temperature	VP	787	787	787	787
Isocyanate		60C	60C	60C	60C
Curing		RT	RT	RT	RT
Hardness					
Material Hardness	45				
Cover Hardness	59/82	58/81	63/87	63/87	64/89
Bashore Rebound					
Physical Properties					
Nameplate Avg	1.684	1.684	1.69	1.69	1.691
Equation Avg	1.683	1.684	1.691	1.691	1.691
Weight Avg	1.607	1.608	1.635	1.636	1.638
Compression	89	90	91	91	93
Performance Data					
Q.O.R @ 125ft/sec	0.807	0.805	0.801	0.803	0.805
Std. Dev	0.0017	0.0026	0.002	0.003	0.001
Durability 1st failure	431X	547X	1@369X	267X	231X
Durability 50% failure or 600 hits	524,539,578X	586X		292,359,548,589X	598X
Cold Crack at 5F	0 Failures	0 Failures	1 at 10X	0 Failures	0 Failures
Quv after 8 Days DVI Db		6.9 4.4	-0.7 -0.3	2.7 1.3	0.0 0.1
Cut & Shear Damage/Appearance	1,1	4,4	4,6	4,5	9,9

Molding Method	PMS 1296P		PMS 1297P		PMS 1298P		PMS 1299P	
	Hand Batch		Hand Batch		Hand Batch		Hand Batch	
Isocyanate	PMS 1296P 13.3%		PMS 1297P 9.11%		PMS 1298P 9.15%		PMS 1299P 9.1%	
Curative	1,4 BDO		1,4 BDO		1,4 BDO		1,4 BDO	
Catalyst	S28755PST3		S28755PST3		S28755PST3		S28755PST3	
ROB Type	.1% T-12		.18% T-12		.125% T-12		.125% T-12	
Temp	787		787		787		787	
Isocyanate	60C		60C		60C		60C	
Curative	RT		RT		RT		RT	
Hardness								
Material Hardness								
Cover Hardness	68/93		58/84		63/85		58/82	
Bashore Rebound								
Physical Properties								
Nameplate Avg	1.691		1.689		1.682		1.684	
Equation Avg	1.691		1.683		1.681		1.683	
Weight Avg	1.636		1.605		1.601		1.604	
Compression	93		90		90		90	
Performance Data								
COF @ 125ft/sec	0.805		0.807		0.797		0.805	
Std Dev	0.003		0.002		0.001		0.002	
Durability 1st failure	16X		0 Failures		552X		0 Failures	
Durability 50% failure or 600 hits	7 by 19X		0 Failures		568,588X		0 Failures	
Cold Crack at 5F	8,10,15X		0 Failures		0 Failures		0 Failures	
QUV after 8 Days DMI Db	2.8 1.4		10.6 6.2		7.3 4.0		5.5 3.3	
Griff & Shear Damage/Appearance	7,8		1,2		7,7		1,3	

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